



User Guide

Wireless Building-to-Building Bridge

3CRWE90096A

Wireless Network Solution

<http://www.3com.com/>
<http://www.3com.com/productreg>

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1

Introduction

The 3Com Wireless Building-to-Building Bridge lets you wirelessly connect previously isolated, wired networks scattered across a campus of buildings. You can extend the reach of any number of wired LANs without needing to physically lay cable between the buildings that house them.

A wireless local area network (WLAN), can be an extension or alternative to a wired network within a building or campus. Data is transmitted and received across the WLAN using radio waves instead of cable. In a wireless LAN environment, no cabling is needed between nodes for data communication. The 3Com Wireless Building-to-Building Bridge provides a way to extend the scope of the wireless LAN far beyond the walls of a particular building.

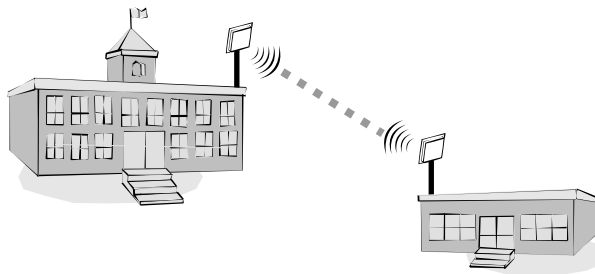
A 3Com Wireless Building-to-Building Bridge can be used in two network configurations, or topologies:

- Point-to-point communication
- Point-to-multipoint communication

This guide explains these network topologies and their components, and leads you through the process of installing, configuring, and administering the 3Com Wireless Building-to-Building Bridge.

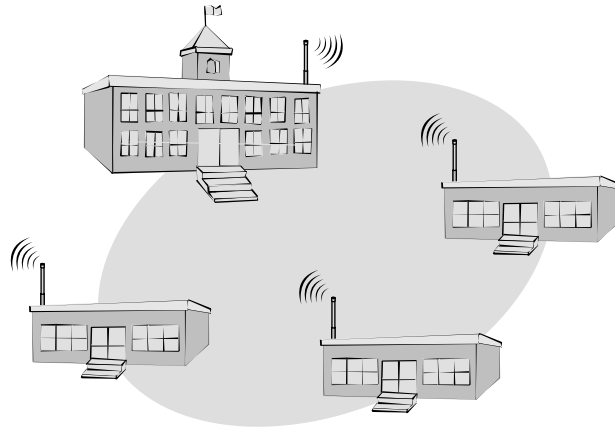
Point-to-Point Topology

Point-to-point topology is the simplest way to use your 3Com Wireless Building-to-Building Bridge. Two wireless bridges form a link between the wired LANs in two separate buildings, as shown in the figure below. This topology typically uses only directional antennas for communication between the two bridges (see "Antennas and Cables" on page 3).



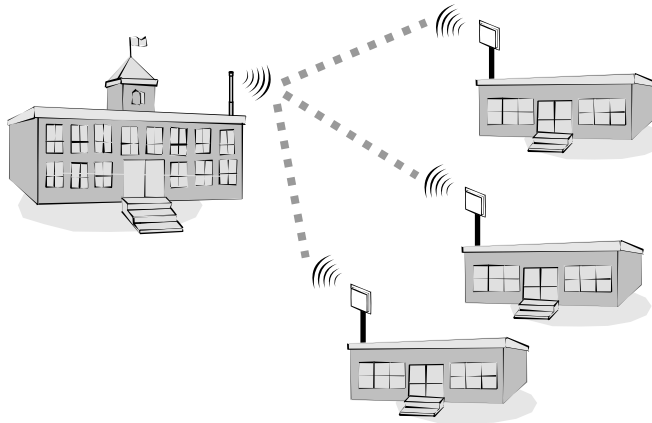
Point-to-Multipoint Topology

3Com Wireless Building-to-Building Bridges can be used for communicating among multiple (two or more) bridges, with each bridge connected to a particular building's wired LAN. The next figure shows a bridging network in which four 3Com Building-to-Building Bridges are used to provide wireless connectivity among four buildings. This topology typically uses omnidirectional antennas for communication between bridges if bridging is desired among all buildings in the bridging network without restriction (see "Antennas and Cables" on page 3).



In this configuration, the wireless bridges make all four wired LANs appear to be connected by the same Ethernet cable. Using wireless bridges in this manner provides a cost-effective way to wirelessly link multiple wired LAN networks by eliminating the need to install cables between buildings.

An alternative point-to-multipoint configuration is shown in the following figure.



In this example, the first building's bridge is using an omnidirectional antenna while the other three buildings have bridges using directional antennas. In this case, the three bridges with directional antennas can communicate only with the bridge using the omnidirectional antenna; they cannot communicate directly with each other. The bridge using the omnidirectional antenna can communicate with the other three bridges.

CAUTION: This alternative, mixed-antenna point-to-multipoint topology, can possibly result in lower performance than a point-to-multipoint configuration that uses only omnidirectional antennas.

Antennas and Cables

You can connect the following types of antennas to the 3Com Wireless Building-to-Building Bridge:

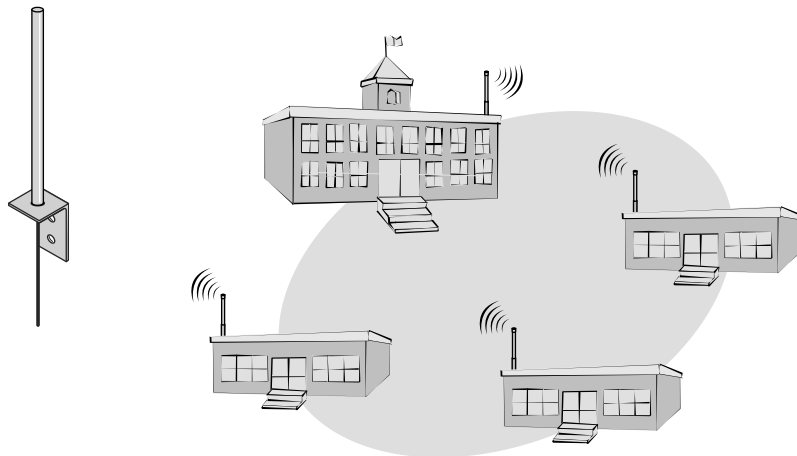
- Flat-panel directional
- Omnidirectional

For best performance, place each antenna outdoors using the mounting hardware provided with the antenna. Outdoor placement is especially important if the building consists of metal construction or has metal siding. If necessary, you can mount an antenna inside a building; however, indoor placement reduces the antenna's effective range.

The following figures illustrate the different types of antennas and typical examples of use. See Chapter 2, "Installing the Hardware and Software," for detailed information about recommended 3Com antennas.

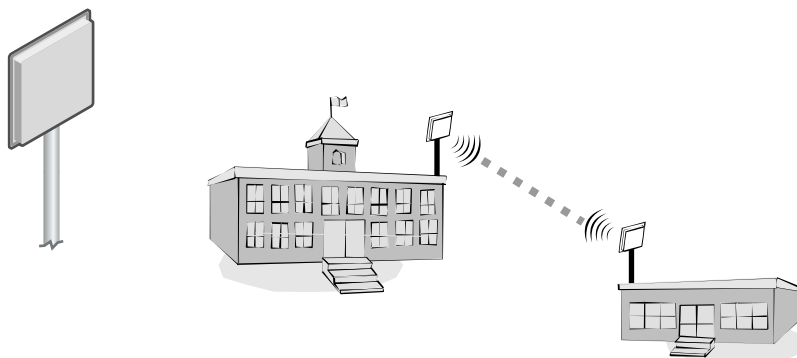
Omnidirectional Antenna

An omnidirectional antenna provides short-range, point-to-multipoint connectivity for two or more wireless bridges. Range with an omnidirectional antenna is approximately 1300 meters at 11 megabits per second (Mbps).



Flat-panel Directional Antenna

A flat-panel directional antenna provides long-range, point-to-point connectivity between two wireless bridges. Range can be as high as 4.1 kilometers (km) at 11 Mbps.



Selecting an Antenna

The following table shows guidelines for selecting antennas based upon their gain properties (expressed in decibels (dB)). The gain of any antenna is essentially a specification that quantifies how well that antenna is able to direct the radiated radio frequency (RF) energy into a particular direction. Thus, high-gain antennas direct their energy more narrowly and precisely, and low-gain ones direct energy more broadly. The range estimates listed are those that can be expected between two 3Com Wireless Building-to-Building Bridges using the listed antenna combinations.

Gain ^a Antenna A	Gain Antenna B	Distance (Meters)	Distance (Miles)	Antenna Types
4	4	522	0.3	Omni-to-omni
4	8	827	0.5	Omni-to-omni
8	8	1,311	0.8	Omni-to-omni
4	13	1,471	0.9	Omni-to-panel
4	18	2,616	1.6	Omni-to-panel
8	13	2,332	1.4	Omni-to-panel
8	18	4,146	2.6	Omni-to-panel
13	13	4,146	2.6	Panel-to-panel
13	18	3,695	2.3	Panel-to-panel
18 ^b	18	3,293	2.0	Panel-to-panel

^aGain is shown in dB

^b18 dB antenna typically paired with 50-ft cable accessory

Antenna Options

The following 3Com antennas are available for use with the 3Com Wireless Building-to-Building Bridge:

- 3CWE490 4 dB Omnidirectional
- 3CWE491 8 dB Omnidirectional
- 3CWE495 13 dB Bidirectional Panel
- 3CWE496 18 dB Directional Panel

Selecting a Cable

Specific cables are available from 3Com for connecting the wireless bridge to an antenna. In planning your bridging topology, it is important to account for signal attenuation due to the cable and connectors used between the bridge and the antenna. Using the shortest cables possible reduces signal loss.

3Com recommends using 50-ft cable with 18 dB antenna (with 10 dB attenuation) for typical installations.

Cable Options

The following 3Com cables are available for use with the 3Com Wireless Building-to-Building Bridge:

- 3CWE480A — 6 ft
- 3CWE481A — 20 ft
- 3CWE482A — 50 ft

2

Installing the Hardware and Software

This chapter describes the contents of the 3Com Wireless Building-to-Building Bridge package, system requirements, configuration guidelines, and hardware and software installation procedures.



CAUTION: Installing the 3Com Wireless Building-to-Building Bridge, cables, and antennas should be done only by professional network personnel.

Wireless Bridge Kit Contents

In your 3Com Wireless Building-to-Building Bridge package, you will find the following components:

- 3Com Wireless Building-to-Building Bridge
- RJ-45 Ethernet crossover cable
- 5.2V Universal AC-to-DC power supply and cord
- Mounting hardware
- Printed quick start guide with warranty
- *Installation* CD containing this user guide and configuration software

If any of these items is missing or damaged, please contact the place of purchase or 3Com Customer Support (<http://support.3com.com>).

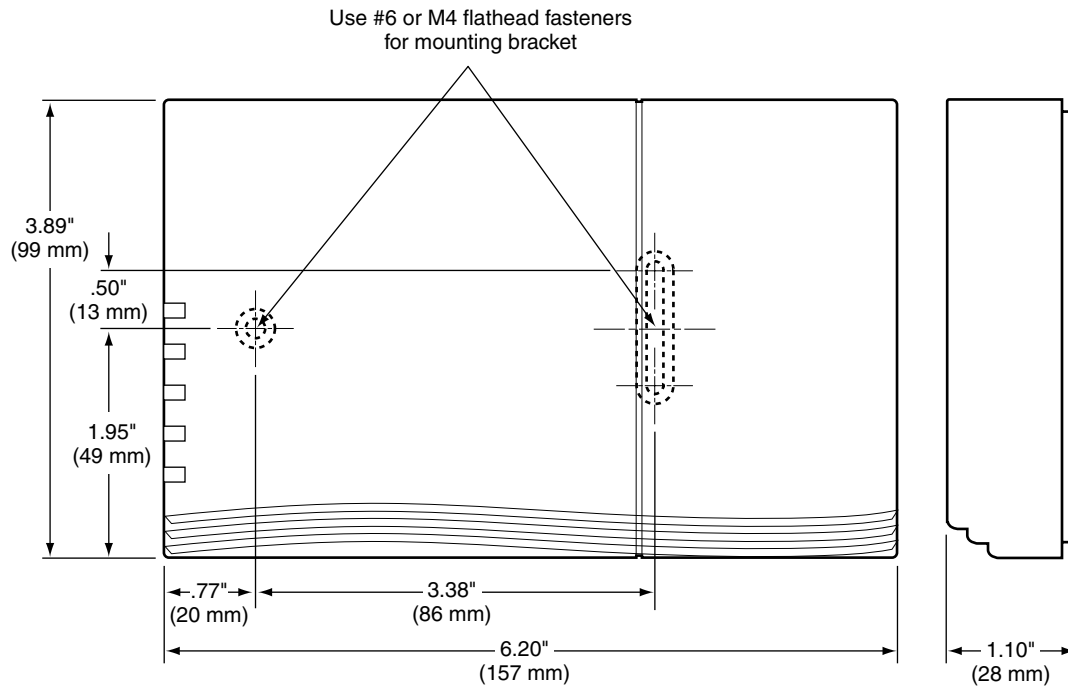
System Requirements

Before you can install a set of wireless bridges, your system environment must satisfy the conditions listed below. You need to have:

- Physically isolated Ethernet LANs
- Two or more 3Com Wireless Building-to-Building Bridges
- One antenna with cable for each wireless bridge unit (can be purchased separately from 3Com as an accessory)
- Computer with Windows 95, 98, Me, Windows 2000, or Windows NT installed

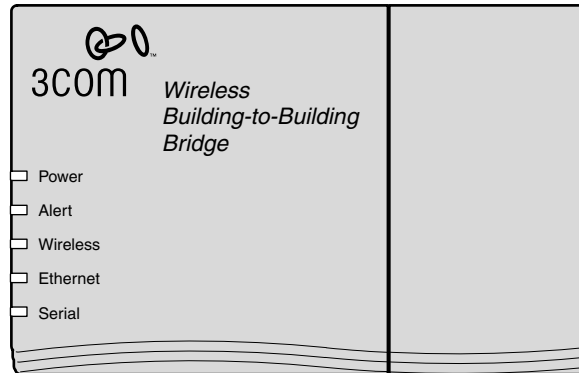
Physical Dimensions

If you want to mount the wireless bridge on a vertical surface, see the outside dimensions and mounting hole dimensions of the mounting plate shown below. Primary dimensions are given in inches and secondary dimensions are shown in millimeters.



LED Indicators

The 3Com Wireless Building-to-Building Bridge has five LED indicators, as shown in the figure below.



The LED indicators are described in the table below:

LED	Lights
Power	Green when power is applied.
Alert	Amber when status information is available. View the event log for status information. (See "Event Log" on page 33 for more information.)
Wireless	Green when the bridge is associated with another bridge and lights amber during radio communication.
Ethernet	Green to show that a valid Ethernet link is present through the 10BASE-T port. Lights amber during Ethernet activity.
Serial	Green when receiving data through the serial port and lights amber when transmitting data through the serial port.

Bridge Placement Considerations

Indoor Location

Place the wireless bridge in a location that:

- Is conveniently located for connection to the Ethernet network.
- Allows easy viewing of the front panel LED indicators, and access to the rear panel connectors, if necessary.

Outdoor Location

It may be necessary to mount the wireless bridge in an outdoor location. If you place the bridge in an outdoor location, you should cover it with an optional outdoor enclosure accessory. To obtain an outdoor enclosure accessory, contact 3Com at <http://www.3com.com>. For installation instructions, refer to the procedure provided with the enclosure accessory.

Considering Antenna Placement

You can place the antenna either indoors or outdoors. An outdoor location, such as a rooftop, provides the following advantages:

- Fewer obstacles to signal paths between wireless bridges
- Increased antenna range
- Fewer multipath problems

Proper Grounding

To ensure the physical safety of anyone near the antenna and to prevent damage to the wireless bridge, follow the building codes for antenna installations in your area. This approach typically means making certain that antennas and antenna masts are appropriately grounded to prevent injury or damage from lightning strikes.

Most of the antennas shipped with the wireless bridge do not have an electrical connection between the mast mount and the coaxial cable shield. However, adding a lightning arrestor will correct that situation by grounding the outer shield as recommended. In some arrestor designs, there is also some over-voltage protection for the signal sent down the cable. If you use such a component, be sure that it is designed to pass signals used in the 2.5 GHz signal range (many inexpensive units are available with F connectors, but these are typically designed for cable TV-UHF applications and may degrade the signals in the band used by the wireless bridge).

Alignment

Position each antenna so that there are minimal obstacles between it and any other antenna with which it will communicate. While maintaining a direct line of sight between antennas is not strictly necessary, such an arrangement helps to ensure a strong signal.

Align each directional antenna to point at the antenna with which it will communicate. If you place two directional antennas at different heights, tilt them up or down toward each other for optimal signal strength. Make sure that the angle of tilt is identical for each antenna: the antenna faces should be parallel.

While aligning the antenna, you may want to use the Wireless Bridge Manager Received Signal Strength Indicator (RSSI) Monitor tool (preferably loaded on a mobile PC that can be used at the antenna site) to adjust the antenna to achieve the maximum possible received signal strength. See “Viewing Signal Strength with the RSSI Monitor” on page 36 for more information.

Polarization

Polarization is a physical phenomenon of radio signal propagation. In general, any two antennas that are to form a link with each other must be set for the same polarization. If for example, two antennas for a link are linearly polarized, they must both be vertically polarized or horizontally polarized. If both antennas do not have the same polarization, the link will either work poorly, or not at all. The situation where one antenna is vertically polarized and the other is horizontally polarized is known as cross-polarization.

Antenna polarity should be identical for each antenna in a bridging link or network. Vertical polarization is preferred in most cases. Make sure that every directional antenna is properly oriented for vertical polarization (according to the polarization indicator shown on the antenna panel).

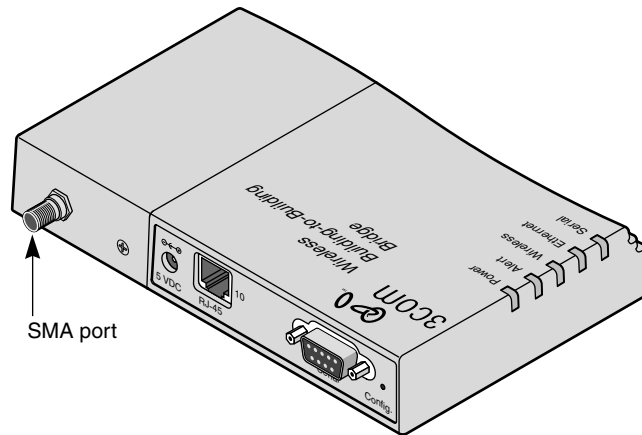
Omnidirectional antennas should be vertically aligned in relation to the ground.

Installing the Hardware

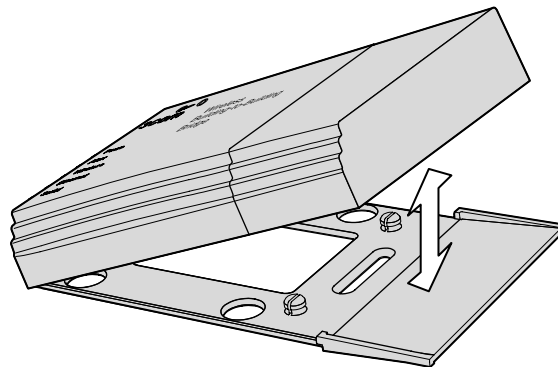


CAUTION: Installing the 3Com Wireless Building-to-Building Bridge, cables, and antennas should be done only by professional network personnel.

- 1 Remove your 3Com Wireless Building-to-Building Bridge from the packaging. The bridge ships fully assembled. An SMA port for attaching the antenna cable is located on one side of the bridge (see figure below).



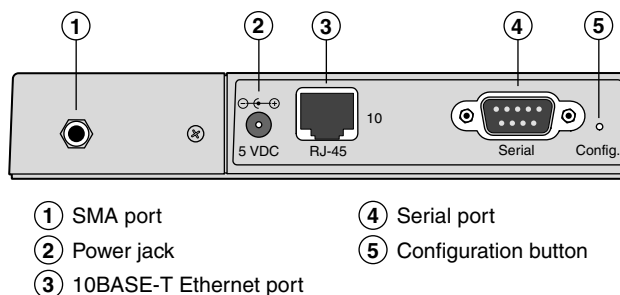
- 2 If you plan to mount the bridge on the wall or ceiling, remove the bottom mounting plate, as shown in the figure below. If you are not mounting the bridge, leave the mounting plate on the bottom of the bridge.



- 3 To mount the bridge, install the mounting plate where desired using the mounting hardware provided (see "Physical Dimensions" on page 6 for the physical dimensions of the mounting plate).

2 Installing the Hardware and Software

- 4 After securing the mounting plate to the desired location, attach the bridge onto the mounting plate.
- 5 If you are mounting the bridge in an outdoor location, install the outdoor enclosure accessory according to the installation instructions provided with the accessory.
- 6 Connect the antenna cable to the SMA port at the end of the bridge unit (see figure below).



- 7 Connect the other end of the antenna cable to the antenna.
- 8 Insert one end of the RJ-45 crossover cable into the bridge 10BASE-T connector. Insert the other end of the cable into your Ethernet LAN connector.
- 9 Connect power to the bridge.
 - a Connect the six-pin DC power cable to the power adapter.
 - b Connect the round power plug of the DC cable to the port labeled 5 VDC.
 - c Connect the AC power cord to the other side of the power adapter.
 - d Insert the AC power cord into an AC power outlet.
- 10 Verify that the bridge Ethernet LED is illuminated (see “LED Indicators” on page 7), indicating a valid Ethernet connection to your Ethernet LAN.

Your bridge hardware is now ready for configuration using the 3Com Wireless Building-to-Building Bridge Manager software.

Installing the Wireless Bridge Manager Software

You can install the 3Com Wireless Building-to-Building Bridge Manager on a PC or workstation running Windows 95, 98, Me, Windows 2000, or Windows NT. The Bridge Manager is a software configuration utility that allows you to graphically and remotely:

- Display a list of wireless bridges running on the local network.
- Display and edit the current configuration of any wireless bridge.
- Save and load configurations.
- Update the wireless bridge firmware.
- Perform all configuration and management functions.

You typically install the Bridge Manager on:

- One desktop computer, through which you can globally configure and administer all of the wireless bridges.
- One laptop computer, through which you can adjust antenna polarization during installation by using the RSSI monitor at the antenna site.

If the Bridge Manager is not available, you can use the terminal configurator as an alternative method to configure the bridge. See Appendix B, "Using the Terminal Configurator," for more information.

- 1 Insert the *Installation* CD into your computer's CD-ROM drive.

If the installation program does not begin automatically:

- a Click *My Computer*.
- b Click the icon for the drive in which the *Installation* CD is located.
- c Double-click *setup.exe*.



NOTE: When you first insert the *Installation* CD or run the Setup utility you will see a message indicating that files are being copied to your system. These are temporary files used by the installation program, and are not the Wireless Bridge Manager program files.

The Welcome screen appears.

- 2 Click *Next* to continue the installation.

The Software License screen appears.

- 3 Click *Yes* to indicate that you agree with the displayed terms.

The Choose Destination Location screen appears. This screen displays the default path and location for the Bridge Manager files and documents:

`c:\program files\3com\3com wireless bridge manager`

You can leave the directory set at the default path, or you can change the directory to suit your requirements.

- 4 Enter the directory in which the Bridge Manager program will be installed. When you have finished, click *Next* to continue.

The Bridge Manager files and documents are installed in the directory you specified. It is possible that the installer will require that you restart your computer to complete the installation. When the installation is complete, a message is displayed that confirms a successful installation.

- 5 Click *Finish* to exit the installation.

The Bridge Manager is now installed and you are ready to use it to configure your wireless bridges. Proceed to Chapter 3, "Configuring the Bridge."

3

Configuring the Bridge

This chapter describes how to add a 3Com Wireless Building-to-Building Bridge to your wireless network using the Wireless Bridge Manager configuration utility.

The 3Com Wireless Building-to-Building Bridge Manager software communicates with each wireless bridge using a non-routable protocol. Therefore, your wireless bridges must be accessible on the local subnet to communicate with the Bridge Manager.

Starting the Bridge Manager

To run the Wireless Bridge Manager, follow these steps:

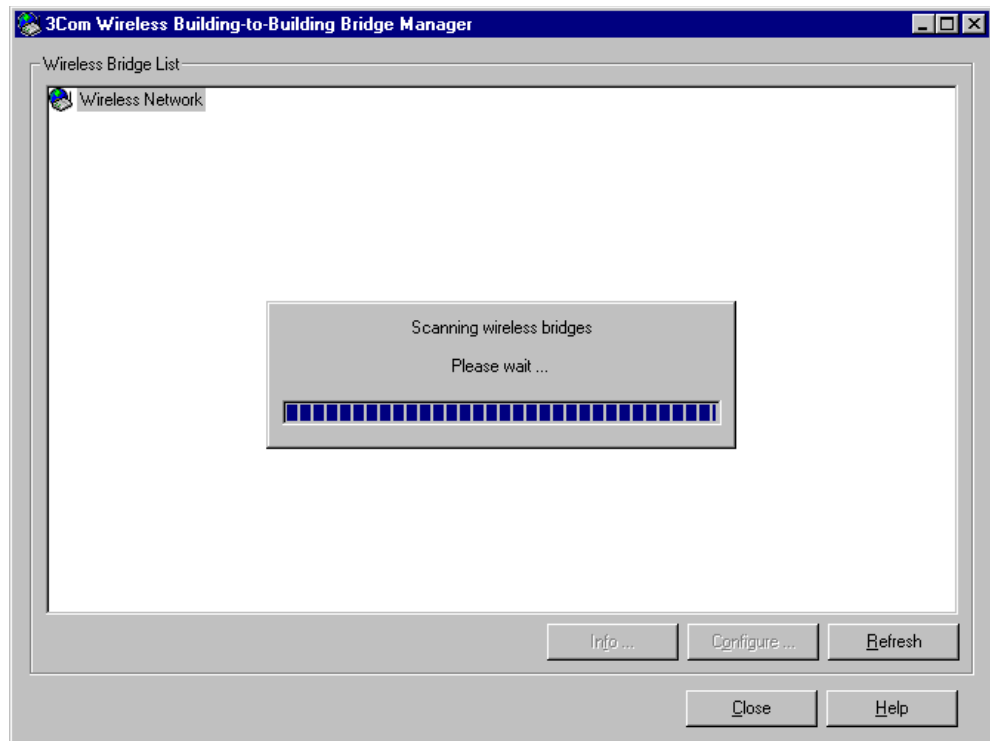
- 1 On the Windows taskbar, click *Start*.
- 2 Select *Programs* and then select the Program Group you created when you installed the Wireless Bridge Manager (see “Installing the Wireless Bridge Manager Software” on page 11).
- 3 Select the *3Com Wireless Bridge Manager* entry.

The 3Com Wireless Building-to-Building Bridge Manager screen appears and the Bridge Manager automatically scans the network for currently accessible bridge groups. (See the next section, “Scanning for Bridge Groups,” for more information about bridge groups.)

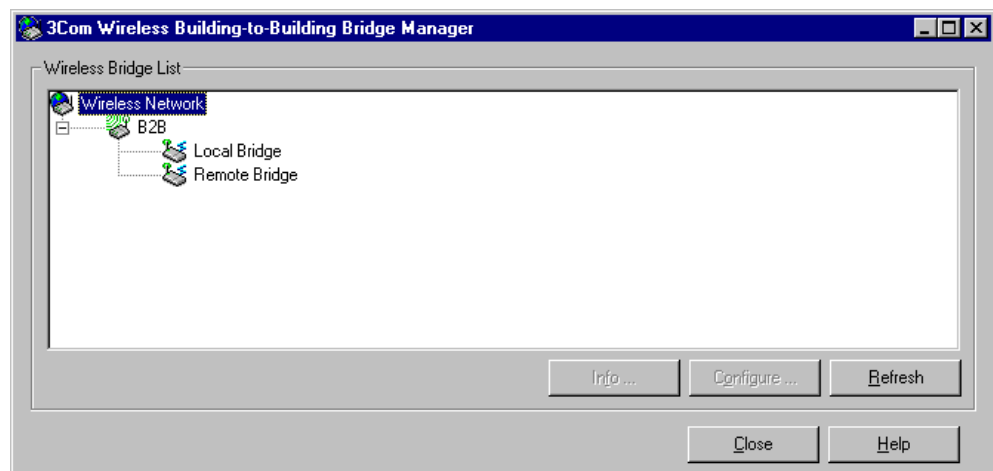
Scanning for Bridge Groups

Whenever it is started, the Wireless Bridge Manager automatically scans the local network to detect currently accessible bridge groups. In this case, a *bridge group* is defined as all wireless bridges having the same wireless local area network (WLAN) service area (also known as an Extended Service Set Identification (ESSID)).

You can force the Bridge Manager to scan the network without having to restart it. To force the Bridge Manager to scan for accessible bridge groups, click *Refresh* in the lower-right corner of the 3Com Wireless Building-to-Building Bridge Manager screen.



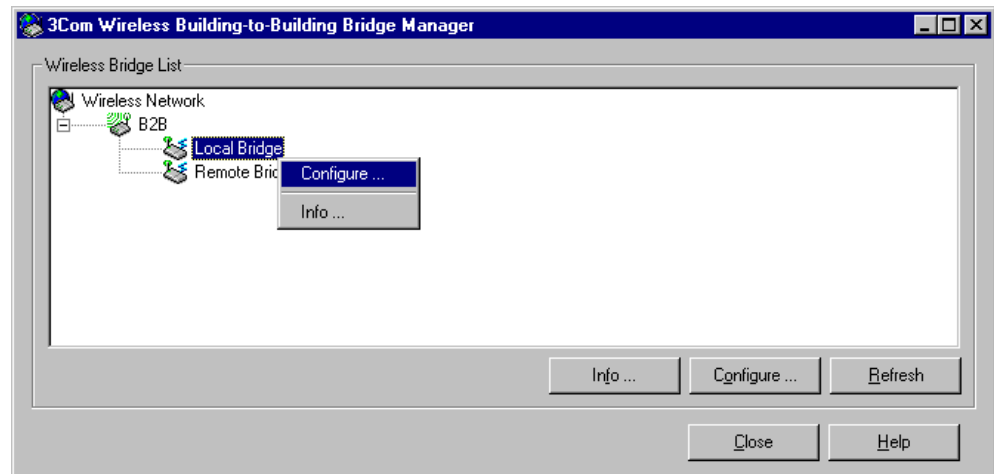
After completing the scan, the Bridge Manager displays the detected bridge groups on the 3Com Wireless Building-to-Building Bridge Manager screen. Also displayed are all the individual bridges associated with each detected bridge group. You configure a bridge unit by selecting it on this screen, as described in the next section "Selecting a Bridge to Configure."



Selecting a Bridge to Configure

To start configuring a wireless bridge unit, display the 3Com Wireless Building-to-Building Bridge Manager screen (described in “Scanning for Bridge Groups” on page 14) and follow these steps:

- 1 To show the options available for a listed wireless bridge unit, right-click the displayed unit name.
- 2 Select *Configure*.

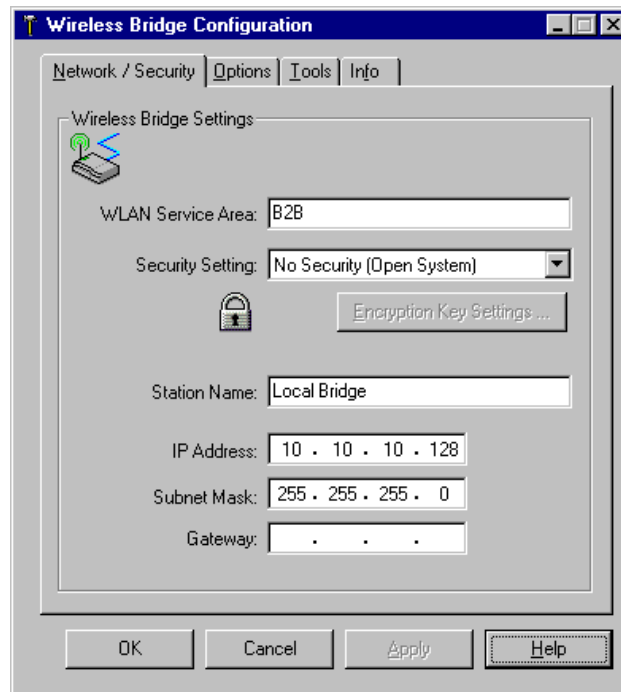


The Wireless Bridge Configuration screen appears (see the next figure), displaying tabs for *Network / Security*, *Options*, *Tools*, and *Info*. The functions of these tabs are described in the following sections.

Setting Network and Security Values

You can change network and security settings for the wireless bridge in the *Network / Security* tab of the Wireless Bridge Configuration screen. The *Network / Security* tab lets you set the following values:

- WLAN service area (ESSID)
- Level of desired WEP (Wired Equivalent Protection) security
- Station name
- IP address
- Subnet mask address
- Gateway address



The image shows a screenshot of the 'Wireless Bridge Configuration' dialog box, specifically the 'Network / Security' tab. The dialog has a title bar with the text 'Wireless Bridge Configuration' and standard window controls. Below the title bar are four tabs: 'Network / Security' (selected), 'Options', 'Tools', and 'Info'. The main area is titled 'Wireless Bridge Settings' and contains several configuration fields. At the top left is a small icon of a wireless router. The fields are: 'WLAN Service Area' with the value 'B2B'; 'Security Setting' with a dropdown menu showing 'No Security (Open System)' and a lock icon below it; a button labeled 'Encryption Key Settings ...'; 'Station Name' with the value 'Local Bridge'; 'IP Address' with the value '10 . 10 . 10 . 128'; 'Subnet Mask' with the value '255 . 255 . 255 . 0'; and 'Gateway' with three empty fields separated by dots. At the bottom of the dialog are four buttons: 'OK', 'Cancel', 'Apply', and 'Help'.

Wireless Bridge Configuration

Network / Security Options Tools Info

Wireless Bridge Settings

WLAN Service Area: B2B

Security Setting: No Security (Open System)

Encryption Key Settings ...

Station Name: Local Bridge

IP Address: 10 . 10 . 10 . 128

Subnet Mask: 255 . 255 . 255 . 0

Gateway: . . .

OK Cancel Apply Help

Network Settings

Network settings determine the wireless network with which the bridge can associate. Some wireless LANs are set up with different WLAN service areas. The WLAN service area is used to specify a unique wireless network. Wireless bridges use the WLAN service area to connect to a specific network. Only bridges with the same WLAN service area can associate with each other; they cannot communicate with bridges that have different WLAN service areas.

To change the *Network / Security* tab settings:

- 1 Enter the name of a WLAN service area.
The WLAN service area (ESSID) is used to specify a unique wireless network. The service area name can be up to 32 alphanumeric characters long. Only bridges with the same WLAN service area can associate with each other; they cannot communicate with bridges that have different WLAN service areas.

- 2 Use the Security Setting pull-down menu to select one of the following WEP security settings:

- No Security (Open System)
- 40-bit shared key for basic encryption
- 128-bit shared key for strong encryption

Using either a 40-bit or 128-bit shared key setting, all wireless bridges in a single wireless LAN service area (sharing the same ESSID) must share the same security key. The security settings for any associating bridge pair must match exactly. For more information about the security settings, see the next section, "Security Settings."

- 3 Enter the Station Name.

The station name is an arbitrary identifier for each wireless bridge. This value lets you conveniently identify the bridges with the Wireless Bridge Manager. Assigning a meaningful station name to each wireless bridge is recommended. Like the WLAN Service Area Name (step 1), this field uses any alphanumeric combination.

- 4 Enter the IP Address you want to assign to the wireless bridge.

The IP address is the network address that will be used by other computers to communicate with the wireless bridge. Assigning an IP address to the bridge is required only if you plan to use Telnet for remote configuration. (See Appendix B, "Using the Terminal Configurator," for more information about using Telnet.)

- 5 Enter the Subnet Mask value.

This value defines the range of IP addresses available within your local network. Assigning a subnet mask address to the bridge is required only if you plan to use Telnet for remote configuration.

- 6 If your network uses a gateway (router or firewall), enter the Gateway IP address.

You must enter the IP address of your gateway if you plan to use Telnet to administer the wireless bridge from computers on a different subnet. You may leave this field blank if no gateway is present or needed. Assigning a gateway address to the bridge is required only if you plan to use Telnet for remote configuration.

- 7 Click *Apply*.

When the wireless bridge has joined your wireless network by associating with another wireless bridge, the radio association LED will light green.

Security Settings

Enabling security is the best way to protect your data from unauthorized observers. 3Com recommends using the strongest encryption setting supported by your wireless bridge.



NOTE: The 128-bit encryption setting may not be available to you, depending on U.S. export restrictions to your country.

The 3Com Wireless Building-to-Building Bridge supports the following levels of hardware encryption:

Security Level	Description
No Security (Open System)	No encryption. The network communications could be intercepted by unintended recipients.
40-bit shared key	Basic encryption.
128-bit shared key	Strong encryption.

Both basic and strong shared-key security settings use industry-standard 802.11 Wired Equivalent Privacy (WEP) encryption methods. Using either setting, all wireless bridges in a single wireless LAN service area must share the same security key. The WEP key settings for any associating bridge pair must match exactly.

You can set the WEP keys in one of two ways. You can:

- **Have the keys automatically generated** — Allows you to easily enter any string of characters (as you would enter a password) that will automatically generate the WEP keys in hexadecimal notation the same way for every wireless bridge you configure.
- **Enter the keys manually** — Allows you to use an existing set of encryption keys, but requires that you manually enter four long series of hexadecimal numbers in exactly the same way for every wireless bridge you configure.

40-bit Shared Key Encryption Settings

Establishing 40-bit shared-key security requires that you set up encryption keys. You can have the encryption keys automatically generated by entering an encryption string, or you can manually enter the keys.

Entering an Encryption String To enter an encryption string that will automatically generate the WEP keys, follow these steps:

- 1 In the *Network / Security* tab of the Wireless Bridge Configuration screen, select *40-bit Shared Key* from the Security setting list (see step 2 on page 17.)
- 2 Click *Encryption Key Settings*.

The 40 Bit Encryption Key Settings screen appears.

- 3 Select *Specify Encryption String*.
- 4 Type the encryption string in the *Encryption String* field. Retype the encryption string in the *Confirm Encryption String* field to make sure that you have entered the string correctly.

A valid encryption string is a string of characters between 6 and 30 characters long. The string can be any combination of letters and numbers and is case-sensitive. The string you enter will automatically generate the actual WEP encryption keys in hexadecimal notation.

- 5 Click *OK* when finished.

Entering the Encryption Keys You can decline to enter an encryption string (as described in the preceding section) and instead manually enter the WEP keys. To manually enter the WEP keys in hexadecimal notation, follow these steps:

- 1 In the *Network / Security* tab of the Wireless Bridge Configuration screen, select *40-bit Shared Key* from the Security setting list (see step 2 on page 17.)

- 2 Click *Encryption Key Settings*.

The 40 Bit Encryption Key Settings screen appears.

40 Bit Encryption Key Settings

☐ Specify Encryption String

Encryption strings are 6 to 30 characters long and case sensitive.

Encryption String:

Confirm Encryption String:

☒ Mask encryption strings

☒ Specify Encryption Keys

Enter the encryption keys and use the radio buttons to select a key to use:

☐ Key #1:

☒ Key #2:

☐ Key #3:

☐ Key #4:

OK Cancel Help

- 3 Select *Specify Encryption Keys*.

- 4 Enter the key settings.

Hexadecimal keys are sequences of hexadecimal digits arranged into four keys. A hexadecimal digit may be a letter from A to F or a number from 0 to 9. You must enter settings for all four keys. All four keys must be entered in precisely the same hexadecimal notation for all the wireless bridges you are configuring for your network.

- 5 Click one of the radio buttons to select the transmit key to use.

- 6 Click *OK* when finished.

128-bit Shared Key

Establishing 128-bit shared key security requires that you set up encryption keys. You can have the encryption keys automatically generated by entering an encryption string, or you can manually enter the keys.

Entering an Encryption String To enter an encryption string that will automatically generate the WEP keys, follow these steps:

- 1 In the *Network / Security* tab of the Wireless Bridge Configuration screen, select *128-bit Shared Key* from the Security setting list (see step 2 on page 17.)

- 2 Click *Encryption Key Settings*.

The 128 Bit Encryption Key Settings screen appears.

- 3 Select *Specify Encryption String*.

- 4 Type the encryption string in the *Encryption String* field. Retype the encryption string in the *Confirm Encryption String* field to make sure that you have entered the string correctly.

A valid encryption string is a string of characters between 6 and 30 characters long. The string can be any combination of letters and numbers and is case-sensitive. The string you enter will automatically generate the actual WEP encryption keys in hexadecimal notation.

- 5 Click *OK* when finished.

Entering the Encryption Keys You can decline to enter an encryption string (as described in the preceding section) and instead manually enter the WEP keys. To manually enter the WEP keys in hexadecimal notation, follow these steps:

- 1 In the *Network / Security* tab of the Wireless Bridge Configuration screen, select *128-bit Shared Key* from the Security setting list (see step 2 on page 17.)

- 2 Click *Encryption Key Settings*.

The 128 Bit Encryption Key Settings screen appears.

128 Bit Encryption Key Settings

☐ Specify Encryption String

Encryption strings are 6 to 30 characters long and case sensitive.

Encryption String:

Confirm Encryption String:

☒ Mask encryption strings

☒ Specify Encryption Keys

Enter the encryption keys and use the radio buttons to select a key to use:

☐ Key #1:

☐ Key #2:

☒ Key #3:

☐ Key #4:

OK Cancel Help

- 3 Select *Specify Encryption Keys*.

- 4 Enter the key settings.

Hexadecimal keys are sequences of hexadecimal digits arranged into four keys. A hexadecimal digit may be a letter from A to F or a number from 0 to 9. You must enter settings for all four keys. All four keys must be entered in precisely the same hexadecimal notation for all the wireless bridges you are configuring for your network.

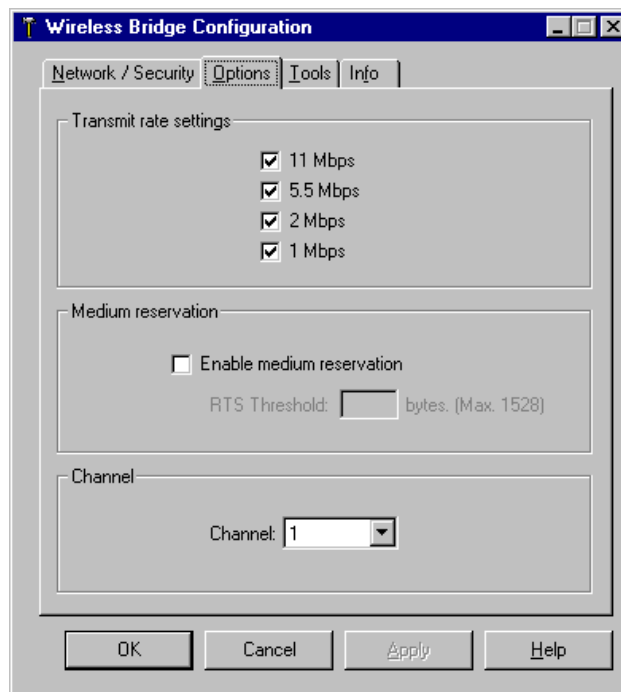
- 5 Click one of the radio buttons to select the transmit key to use.

- 6 Click *OK* when finished.

Setting Network Transmission Options

The *Options* tab of the Wireless Bridge Configuration screen lets you set values for the following options:

Options	Purpose
Transmit rate settings	Control the rates at which the wireless bridge makes physical layer transmissions.
Medium reservation	Controls the 802.11 Request to Send/Clear to Send (RTS/CTS) mechanism.
Channel	Controls the radio frequency.



Setting the Transmit Rates

The transmit-rate-settings parameter controls the rates at which the wireless bridge makes physical layer transmissions. The rates listed are those supported by the 802.11b radio. These rates refer to the physical layer transmissions, and do not necessarily correspond to the data throughput that you will achieve. Data throughput is affected by many factors, including distance, signal quality, and network protocol.

Use the check boxes to specify the allowed transmit rates for the radio. If you select multiple allowed transmit rates the unit will automatically use the highest available rate based on signal quality. When the signal quality is poor the radio will drop back to lower rates.



NOTE: 3Com recommends that you select *all* the Transmit rate settings (11, 5.5, 2, 1 Mbps) to achieve the best performance.

If you force the radio to a lower rate, then it will operate better with poor signal quality. If you force the radio to a higher rate, then it will operate only when the signal quality is high. In general, you should leave this setting at the default of all rates allowed.

The following table shows the allowable combinations of transmit rate settings. You should use the same transmit rate settings for all wireless bridges sharing WLAN service area (ESSID):

Combination	Settings (On)	Description
A	1, 2, 5.5, 11 Mbps	11 Mbps with auto-fallback
B	1, 2 Mbps	2 Mbps with auto-fallback
C	1 Mbps	1 Mbps

Setting Medium Reservation

The medium reservation parameter controls the 802.11 Request to Send/Clear to Send (RTS/CTS) mechanism. It is used to force the radio to perform a Request to Send and receive a Clear to Send before transmitting packets. One of the bridges in the system acts as the coordinator for all transmissions. The coordinator issues the Clear to Send messages for all other bridges that are making Requests to Send. There is not a way to specify which bridge will be the coordinator.

When medium reservation is enabled you must specify the RTS threshold. The threshold is the packet length, in bytes, above which the radio will make the RTS and wait for CTS before sending the packet. For example, if you enable medium reservation with an RTS threshold of 500, then all packets of length greater than or equal to 500 bytes will not be transmitted until the radio first issues an RTS and then receives a CTS from the coordinator. Packets less than 500 bytes will be sent as soon as the channel is free, without first undergoing the RTS/CTS mechanism.

Setting the Channel

The 802.11 standard specifies a number of different frequency channels. The regulatory bodies of your country control the frequency channels that you may use. Use the pull-down menu to see the list of channels supported by your wireless bridge unit.



NOTE: To ensure operation on a specific channel, all bridges with the same WLAN Service Area Name (see step 1 on page 17) must have the same channel setting.

4 Using System Tools and Viewing Information

This chapter describes various system tools available for use with the 3Com Wireless Building-to-Building Bridge. The wireless bridge system tools allow you to:

- Write a configuration to a file.
- Reload a saved configuration file to a selected bridge.
- Reset the unit.
- Restore the unit default settings.
- Update the bridge firmware.
- Change the bridge password.
- View log information.
- View the signal strength of packets received by the wireless bridge.

Accessing System Tools

Selecting the *Tools* tab displays the available system tools for the wireless bridge.



Saving and Loading Configurations

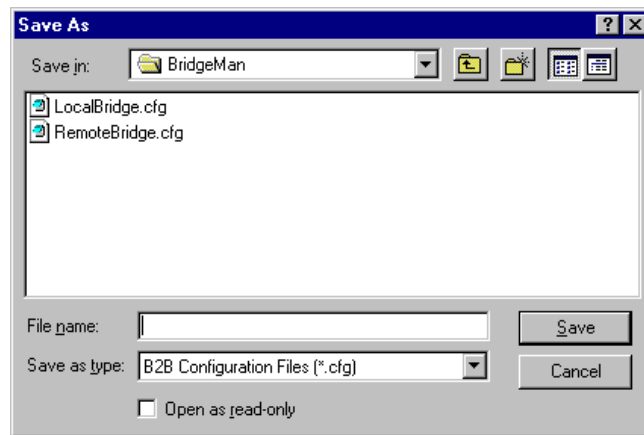
Selecting the *Tools* tab on the Wireless Bridge Configuration screen displays the *Load Config (Configuration) From File* and *Write Config To File* tools. Use these tools to back up the bridge configuration settings once you are satisfied with them, and recover the bridge configuration settings, if necessary. For example, if you have to reset the unit to its original default settings for troubleshooting purposes, you may want to later restore a particular set of configuration values.

Saving a Configuration

You can write (save) the configuration settings of the wireless bridge to a local file. This feature allows you to save settings of a known state for backup purposes or easily configure multiple bridges with the same settings. To save a configuration file, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *Write Config To File* icon.

The Save As screen appears, displaying all the currently saved configuration files.



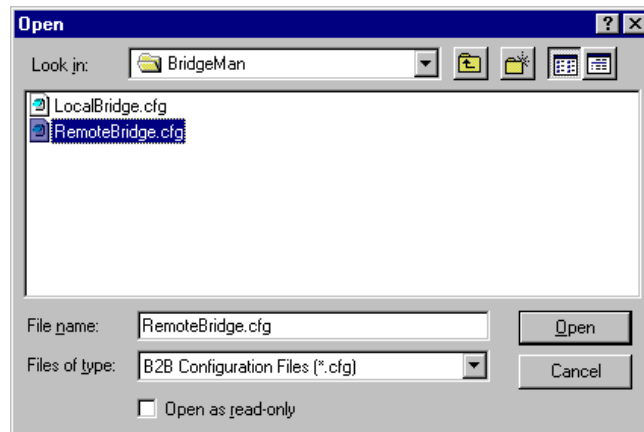
- 3 Type a name for the saved configuration file in the *File name* field.
- 4 Click *Save* to save the configuration.
A message is displayed once the configuration file has been successfully saved.

Loading a Configuration

The Wireless Bridge Manager allows you to easily reload a saved configuration file to the currently selected bridge. To reload a saved configuration file, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *Load Config From File* icon.

The Open screen appears, and displays all the saved configuration files.



- 3 Select the saved configuration file from the Open window.
- 4 Click *Open* to load the configuration.

A message is displayed once the configuration file has been successfully loaded.

Resetting the Unit

If you experience a persistent problem with your wireless bridge, you can perform a reset of the bridge unit in a way that does not erase your configuration settings. Resetting the unit from the *Reset Unit* icon clears:

- Some of the error log (see “Event Log” on page 33)
- The bridge unit forwarding table (see “Forward Table” on page 34)

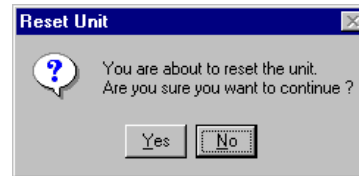
During the reset, bridging through the unit will be temporarily interrupted, and the bridge will have to “relearn” the forwarding table.

If resetting the unit does not fix the problem, then you may have to perform a “hard” reset that completely restores all the bridge configuration settings to their initial factory default values. (See “Resetting the Unit to Factory Defaults” on page 28.) To help diagnose the problem, see Chapter 5, “Troubleshooting Bridge Problems.”

To reset the wireless bridge unit, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *Reset Unit* icon.

The Reset Unit screen appears, asking you to verify that you want to restart the bridge unit.



- 3 Click Yes to restart the unit.

Resetting the Unit to Factory Defaults

If resetting the unit (as described in the preceding section) does not fix the problem, then you may have to perform a “hard” reset that completely restores all the bridge configuration settings to their initial factory default values. To help diagnose the problem, see Chapter 5, “Troubleshooting Bridge Problems.”

You can perform a “hard” reset in two ways to restore all the bridge configuration settings to their initial factory default values. You can either:

- Double-click the *Reset to Default* icon from the *Tools* tab of the Wireless Bridge Configuration screen. (See the next section, “Using the Reset to Default Icon.”)
- or
- Use a paper clip to press the configuration button (labeled *Config.* in the illustration on page 10) located next to the serial port on the back panel of the bridge.) (See “Resetting by Using the Configuration Button” on page 29.)



CAUTION: Resetting to factory defaults resets all wireless bridge configuration parameters, including the WLAN service area name (ESSID). Resetting to defaults might leave your bridge in a non-reachable state, depending on your current radio network setting.

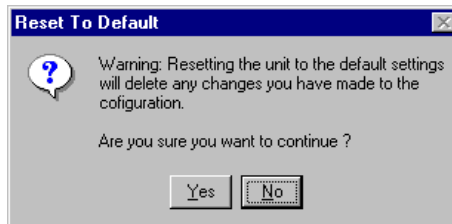
For example, if a reset wireless bridge is not on the same wired LAN section as your PC, it is possible that the bridge will lose association with the other bridges, and the configuration utility will no longer be able to communicate with the bridge. If this situation happens, you must connect the bridge to your PC through an Ethernet cable. You will then be able to use the Wireless Bridge Manager to set the WLAN service area name to that of your bridge.

Using the Reset to Default Icon

To reset the wireless bridge unit configuration settings to their factory default values, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *Reset To Default* icon.

The Reset To Default screen appears, asking you to verify that you want to restart the bridge unit.



- 3 Click Yes to restart the unit.

Resetting by Using the Configuration Button

You can also reset the 3Com Wireless Building-to-Building Bridge to factory default settings without using the Bridge Manager:

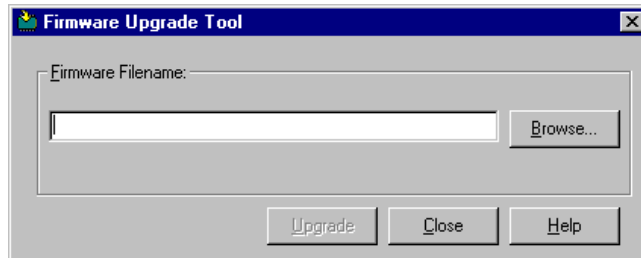
- 1 Disconnect power to the bridge.
- 2 Insert one end of an extended paper clip into the small hole labeled *Config*. (located near the serial port on the bridge back panel) to press the configuration button.
- 3 While keeping the configuration button pressed, reconnect power to the bridge. Press the configuration button for at least five seconds after power is applied. The bridge will be reset to factory defaults once the lights start to blink.

Updating the Bridge Firmware

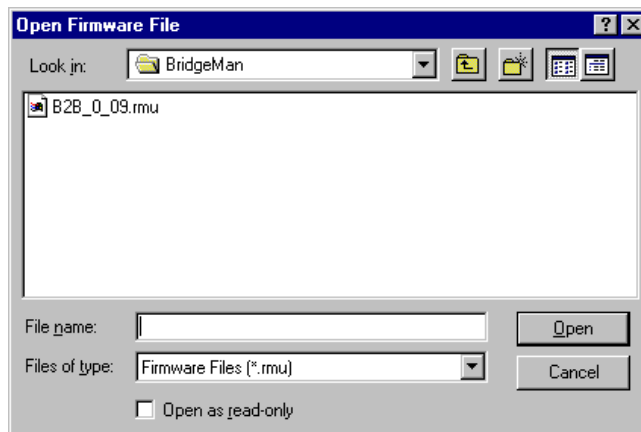
The 3Com Wireless Building-to-Building Bridge ships with the most current firmware available. Over time, as features are added and problems are fixed, newer firmware may become available. If you are having trouble with your wireless bridge, it is recommended that you first upgrade to the latest firmware version.

Follow these steps to update the wireless bridge firmware to the latest version:

- 1 Download the latest version of firmware from <http://support.3com.com> to the computer that is currently running the Wireless Bridge Manager.
The firmware file has the extension .RMU.
- 2 After downloading the firmware, select the *Tools* tab from the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15).
- 3 Double-click the *Firmware Upgrade* icon.
The Firmware Upgrade Tool dialog box appears.

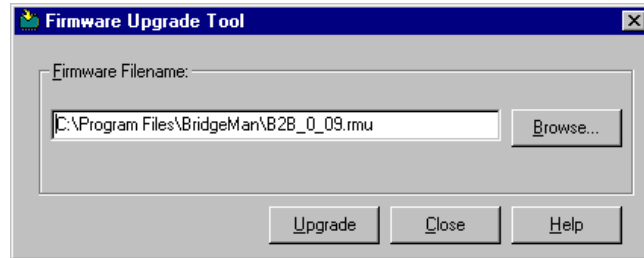


- 4 If you know the name and location of the file, enter it in the *Firmware Filename* field, otherwise click *Browse* to locate the firmware file on your computer.
Clicking *Browse* displays the Open Firmware File screen:

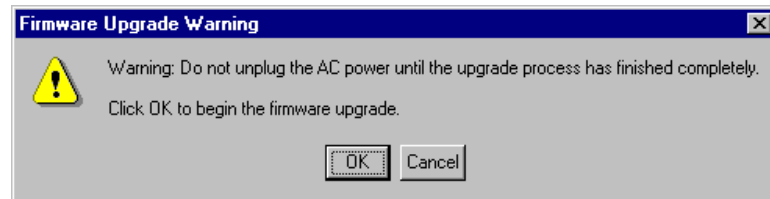


- 5 Use the Open Firmware File screen to locate the firmware file. Select the file and click *Open*.

The Bridge Manager fills in the path and file name in the Firmware Upgrade Tool screen for the file you selected, as shown here:

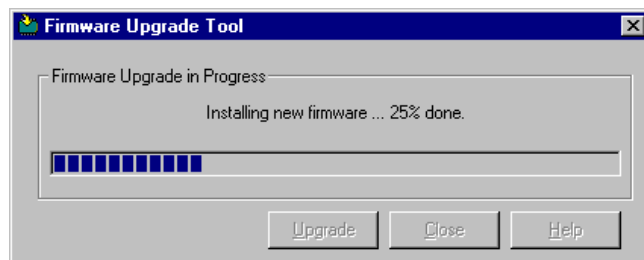


- 6 Click *Upgrade* to begin the upgrade process using the selected firmware. A warning is displayed instructing you not to disrupt power to the unit while the update is in progress.

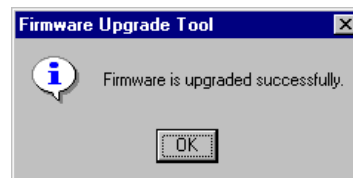


- 7 Click *OK* to continue.

The Bridge Manager first validates the firmware (.RMU) file, checks for components that should be loaded on the bridge, and then sends the components to the bridge. A progress indicator is displayed, as shown in the next figure. Firmware installation can take from 30 seconds to a few minutes depending on the number of components being updated. A status indicator updates the progress, as shown below.



After the bridge has completely installed the new firmware, a message is displayed.



- 8 Click *OK* to acknowledge the successful upgrade and return to the Firmware Upgrade Tool window.
- 9 Click *Close* to close the Firmware Upgrade Tool window and return to the *Tools* tab of the Wireless Bridge Configuration screen.

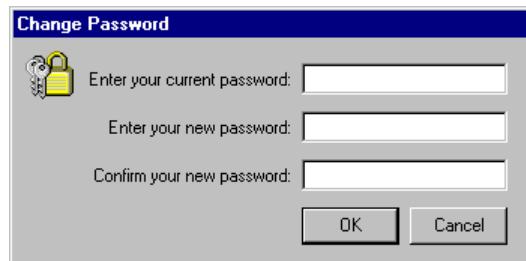
Setting the Password

Setting a password prevents unauthorized users from accessing or changing the settings for your wireless bridge. You must enter this password each time you reconfigure the bridge. It is recommended that you set a password for each wireless bridge.

To initially set or change the password, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *Change Password* icon.

The Change Password dialog box appears.

A screenshot of the 'Change Password' dialog box. The title bar is blue with the text 'Change Password'. Inside the dialog, there is a yellow padlock icon on the left. To the right of the icon are three text input fields. The first field is labeled 'Enter your current password:', the second is labeled 'Enter your new password:', and the third is labeled 'Confirm your new password:'. At the bottom right of the dialog are two buttons: 'OK' and 'Cancel'.

- 3 If you are changing an existing password, type the active password in the *Enter your current password* field. (If you are entering a new password for the first time, leave the *Enter your current password* field blank.)
- 4 Type the new password in the *Enter your new password* field. Type the new password a second time in the *Confirm your new password* field to verify the accuracy of your entry.
Entering blank text for the “new password” will remove the active password. If the active password is removed, the Wireless Bridge Manager will not prompt for a password.
- 5 Click *OK* to immediately activate the new password.

Using the Log Viewer

The Log Viewer lets you display:

- The different logs and tables stored on the wireless bridge.
- Status and error messages issued by the wireless bridge.



NOTE: Viewing the logs may interrupt network connectivity. Therefore, it is recommended that you try to schedule viewing the logs for a time when the rate of network traffic is at a minimum, preferably after normal working hours.

To display the Log Viewer screen, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *Log Viewer* icon.

The Log Viewer screen appears, displaying the Event Log tab (see the next illustration). Switch among the three available logs by choosing the different tabs. The three logs available through the Log Viewer are:

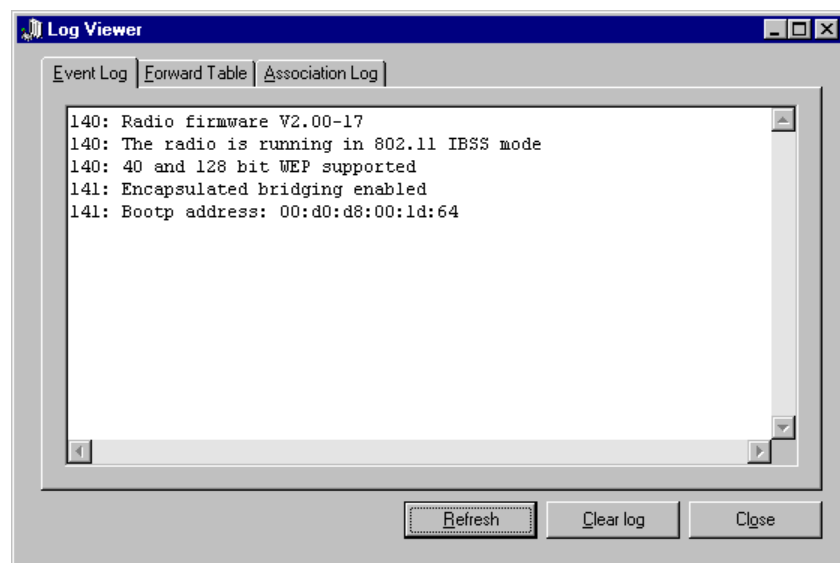
- **Event Log** — Displays basic information and status messages generated by the wireless bridge.
- **Forward Table** — Displays the MAC addresses that have been seen by the wireless bridge.
- **Association Log** — Displays association and disassociation events.

Event Log

The event log displays messages generated by the wireless bridge. Event log messages include basic information about the bridge hardware and any status messages generated by the bridge. To clear the entries from the event log, click *Clear Log*. If the Alert light is on, clearing the event log turns it off.

The time stamp indicates the number of 10-millisecond periods since the unit was turned on or reset. For example, a time stamp of 6000 corresponds to a time of 60 seconds, and a time stamp of 20 corresponds to a time of 0.2 seconds.

See “Diagnosing Problems” on page 39 for more information about troubleshooting bridge problems using the event log.



Forward Table

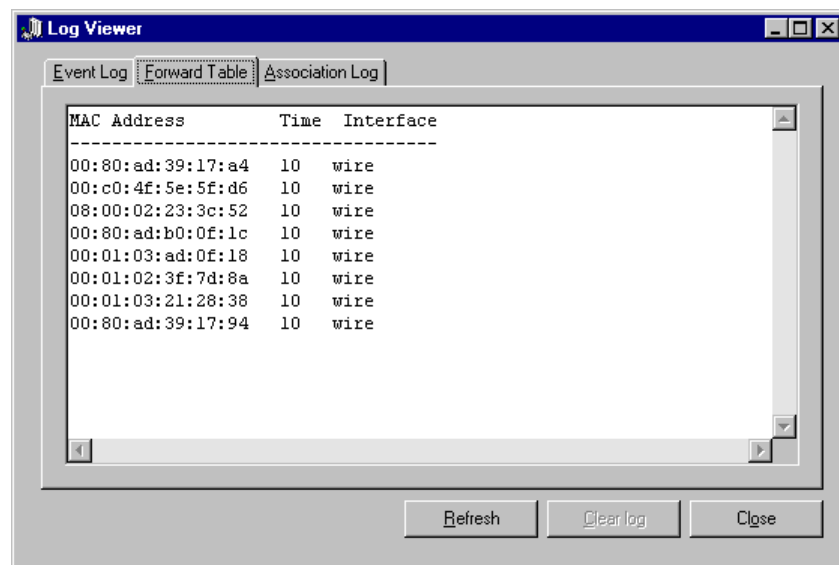
The forward table displays the MAC addresses that have been detected by the wireless bridge. The table lists the interface, wire (10BASE-T) or radio (Wireless), on which each MAC address was observed. The time for each entry indicates the number of seconds until that entry will be removed from the table.

The forward table helps the wireless bridge make efficient use of the radio bandwidth. The wireless bridge uses the forward table to decide if packets received on the wired interface should be sent to the radio and transmitted to remote bridges.

The local wireless bridge attached to your LAN uses the forward table to identify traffic that remains on the local side of the wireless link. The local wireless bridge does not forward those packets to remote wireless bridges because the forwarding table “knows” that the source and destination computers are on the local network.

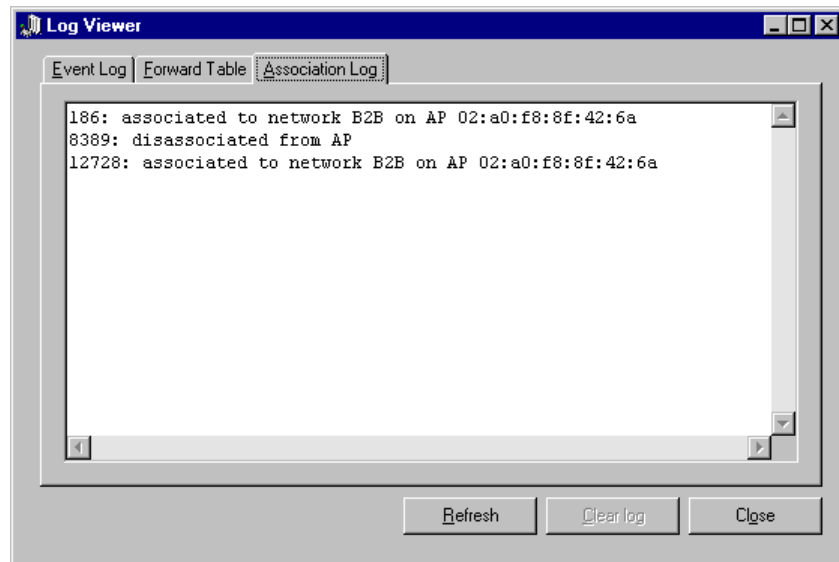
When the wireless bridge detects a new source MAC address, it adds that address to the forward table and the interface value is set to the interface on which the packet was received. If there is no further activity for this MAC address, the time for the entry will decrease until it reaches zero. When the time for an entry reaches zero it is removed from the forward table.

The forward table can hold 1024 entries; however, the Bridge Manager displays only the first 20 to 30 entries. These top entries are the MAC addresses with the most recent activity. To see the complete forward table you must use the terminal configuration interface, described in Appendix B, “Using the Terminal Configurator.”



Association Log

The Association Log records association and disassociation events. Each association event is recorded with a time stamp and, if available, the MAC address and WLAN service area name of the bridge with which the association was made. Each disassociation event contains only a time stamp. The time stamp indicates the number of 10-millisecond periods since the unit was turned on or reset. For example, a time stamp of 6000 corresponds to a time of 60 seconds, and a time stamp of 20 corresponds to a time of 0.2 seconds.



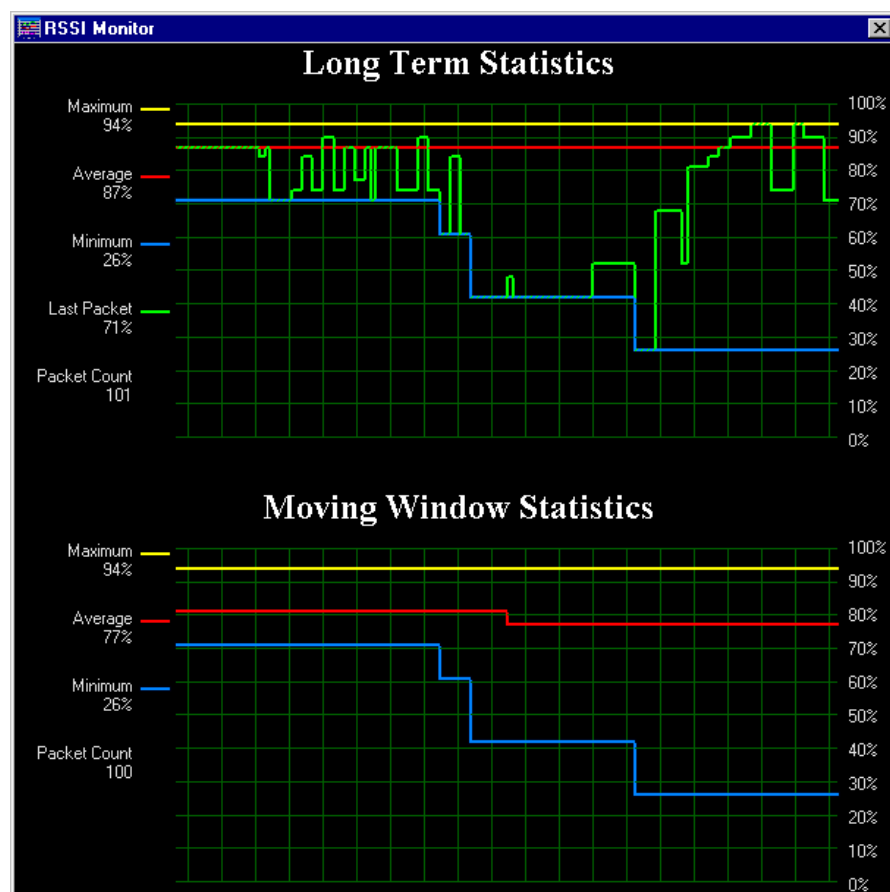
Viewing Signal Strength with the RSSI Monitor

The RSSI Monitor tool provides graphical information about the signal strength of packets received by the wireless bridge. While this tool is open, the Received Signal Strength Indicator (RSSI) information is updated each time the unit receives a data packet. This tool is a useful aid when aligning your antennas. You want to adjust your antennas to achieve the maximum possible received signal strength. There are no units of value associated with the signal strength; it is reported as a percent of the maximum attainable value.

To use the RSSI Monitor, follow these steps:

- 1 From the Wireless Bridge Configuration screen (see “Selecting a Bridge to Configure” on page 15), select the *Tools* tab.
- 2 Double-click the *RSSI Monitor* icon.

The RSSI Monitor appears.



The RSSI Monitor displays two moving graphs:

- Long Term Statistics
- Moving Window Statistics

Long Term Statistics

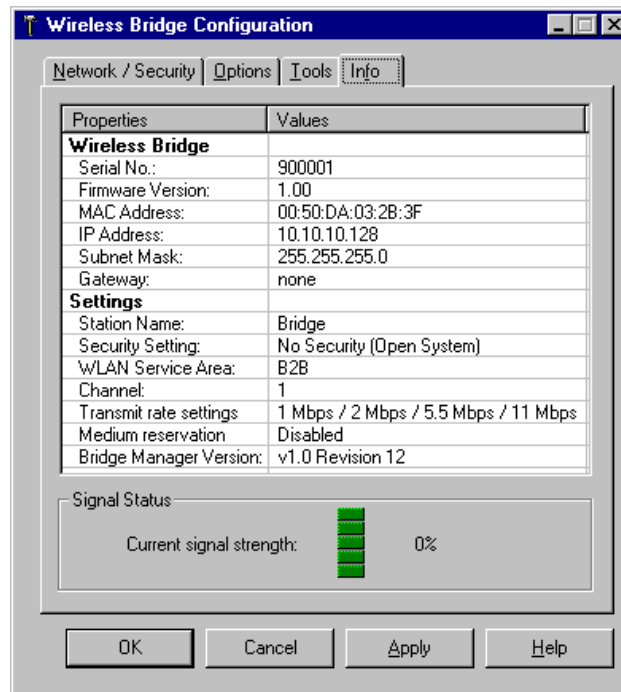
The top graph in the RSSI Monitor displays Long Term Statistics. The information in this graph is reset every time you open the RSSI Monitor. It reports the Maximum, Average, and Minimum received packet signal strength for all packets since the RSSI Monitor was opened. This graph also shows the received signal strength of the last packet received. The Packet Count indicates how many packets have been received since the monitor tool was opened.

Moving Window Statistics

The Moving Window Statistics are very similar to the Long Term Statistics; however, Moving Window Statistics are calculated over only the last 100 (maximum) received packets. The Moving Window Statistics give you an idea of the more recent signal strength, whereas the Long Term Statistics reflect all observations since the RSSI Monitor tool was opened. This graph displays the Maximum, Average, and Minimum received packet signal strength over the last 100 packets. If less than 100 packets have been received since the monitor tool was opened, then the statistics are calculated over that number. The Packet Count indicates the number of packets that are included in the Moving Windows Statistics.

Viewing System Information

Selecting the *Info* tab on the Wireless Bridge Configuration screen displays information about the wireless bridge settings and network connection, as shown in the figure below.



5

Troubleshooting Bridge Problems

If your 3Com Wireless Building-to-Building Bridge is not operating properly, make sure the bridge is running the latest firmware, and use this guide before contacting 3Com Customer Support through the 3Com Customer Support Web site:

<http://support.3com.com>

Upgrading Firmware

If you have any trouble with your bridge unit, go first to the Web site shown below and download the latest version of the 3Com Wireless Building-to-Building Bridge firmware. You can find firmware upgrades at the 3Com Customer Support Web site:

<http://support.3com.com>

See “Updating the Bridge Firmware” on page 30 for detailed instructions.

Diagnosing Problems

Error Indicator	Problem	Solution
The Power LED is off or the power light is blinking.	The wireless bridge is not receiving power properly.	Verify that all physical connections are securely in place. Contact Customer Support if the problem persists.
The Alert LED is on.	There is a configuration or software alert condition.	Check the System Event Log to determine the cause. (See “Event Log” on page 33.) See the Event Log Error Table for details. Use the Clear Event Log option to clear the event log and turn off the Alert LED.
The wireless bridge is connected to an Ethernet cable, but the Ethernet link LED is not on.	There is an invalid connection to Ethernet.	Verify that both ends of the cable are plugged in securely. If the wireless bridge is attached to a hub, a crossover Ethernet cable must be used. If the bridge is attached directly to an Ethernet device (for example, a PC or Ethernet printer), it must be a straight-through cable. Verify that you are using the correct cable. If you are using the correct cable, verify that you are connecting the bridge to a 10BASE-T Ethernet device. The wireless bridge does not support 100BASE-T.
The Wireless LED is off and the Alert LED is off.	The bridge is not linking to other bridges.	Verify that the WLAN service area name is set to match the WLAN service area names of the other bridges in the network. Verify that the antenna cable is firmly attached to the SMA port on the bridge and to the connector of the antenna. If you are using flat-panel antennas, verify that the panel faces are parallel: the panel faces must be directly facing each other.

Handling Event Log Errors

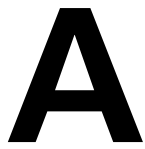
The following table lists event log errors. (See “Using the Log Viewer” on page 33 for more information about accessing the event log.) All entries in the event log are preceded by a number. This number is a time stamp used by Customer Support, but is not relevant to looking up items in this table.

Error Code	Description
UART Error – No Rx Buffer Available	Data is being sent to the UART at a rate faster than it can clear its receive buffers, and data is being lost. Note that if you are using the serial port menu system for configuration, flow control will not be enabled in the wireless bridge. To avoid getting this error while in the serial port configuration system, simply type slower.
Initialization of interface "lan0" failed.	The bridge could not be initialized. Try each of the following steps in order. If any of these steps succeeds, there is no need to perform any of the later steps; otherwise continue to the next step. <ol style="list-style-type: none"> 1 Reset the wireless bridge. 2 Unplug the power, wait for approximately 30 seconds and then reapply power. 3 Reset the wireless bridge to the factory default configuration and reset the wireless bridge. 4 Contact 3Com Customer Support if the problem persists.

Handling Terminal Configurator Error Codes

See Appendix B, “Using the Terminal Configurator,” for detailed information about using the Terminal Configurator method to configure your 3Com Wireless Building-to-Building Bridge.

Error Code	Description
Xxxx: [yyyy]: section does not exist	Section named yyyy in configuration file named xxxx was missing. Save your current configuration (if applicable). Reset the wireless bridge configuration to factory defaults. Reset the wireless bridge. Restore configuration (if applicable).
Xxxx: [yyyy]: "zzzz": entry refers to non-existent section	Entry zzzz refers to a section that is not located in file xxxx. Save your current configuration (if applicable). Reset the wireless bridge configuration to factory defaults. Restore configuration (if applicable).
Xxxx: [yyyy]: "zzzz": entry does not exist	Entry zzzz in section yyyy of file xxxx was missing. Save your current configuration (if applicable). Reset the wireless bridge configuration to factory defaults. Reset the wireless bridge. Restore configuration (if applicable).
Xxxx: [yyyy]: "zzzz": entry is invalid	Entry zzzz in section yyyy of file xxxx contains an invalid value. Check the entry in the configuration for zzzz. If you cannot find zzzz in the wireless bridge Bridge Manager program, you may have to use the serial port or Telnet configuration menus.
Xxxx: <[yyyy]zzzz>: Unable to add route.	Route values are out of range compared to the interface values. Set the route value to “automatic.” If “automatic” does not work for your wireless bridge, check the values you set for the route to make sure they correspond to your other IP parameters.
Xxxx: file does not exist.	Configuration file could not be found. Reset the configuration to factory defaults, and reset the wireless. If the problem persists, contact 3Com Customer Support.



Technical Specifications

Supported Standards

Network Standard

- IEEE 802.11b¹

Network Architecture Types

- Bridge 802.3 to 802.11b

Network Connection Type

- 10BASE-T

Bridging Protocol

- MAC layer encapsulation

Encryption

- 40- and 128-bit WEP encryption, shared key

Security

- VPN pass through

Power Specifications

Available Transmit Power Settings

- 300 mA, typically

1.While the 3Com Wireless Building-to-Building Bridge conforms with the IEEE 802.11b standard, it is not compatible or interoperable with other IEEE 802.11b devices.

Radio Specifications

Frequency Band

- 2.4 GHz

Range

- Transmit and receive information up to 2.6 miles (4,146 meters) between wireless bridges (depending on antenna selection)

Wireless Medium

- DSSS

Media Access Protocol

- CSMA/CA

Modulation

- DSSS

Operating Channels

- 1 through 11 (U.S.)

Nonoverlapping Channels

- 1, 6, and 11

Sensitivity and Data Rate

Receive Sensitivity

- 11 Mb: -81 dBm
- 5.5 Mb: -84 dBm
- 2 Mb: -85 dBm
- 1 Mb: -87 dBm

Data Rates Supported

- 11, 5.5, 2, 1 Mbps

Configuration and Management Features

Local Configuration

- GUI console

Remote Configuration Support

- GUI, Telnet

Dimensions

Length: 6.20 inches (157 mm)

Width: 3.89 inches (99 mm)

Height: 1.10 inches (28 mm)

Environmental

Environment	Limits
Storage temperature	-20° to +70° C (-4° to 158° F)
Operating temperature	-20° to +55° C (-4° to 131° F)
Humidity	95% maximum, Non-condensing
Operating altitude	-100 m to 3,000 m (-328 ft to 9,840 ft)
Transportation/storage altitude	-100 m to 4,500 m (-328 ft to 14,800 ft)
Electrostatic discharge	±15 kV, air ±8 kV, contact ±2 kV, pin
Power supply noise and interference	70 mV rms, 30 Hz to 400 MHz

B

Using the Terminal Configurator

You can use the Terminal Configurator as an alternative method to configure your 3Com Wireless Building-to-Building Bridge in the event that the Wireless Bridge Manager configuration utility (Chapter 3) is not available. The Terminal Configurator is a text-based configuration method that lacks many of the features of the Bridge Manager. The terminal configurator can be accessed using a direct serial or Telnet connection.

When using a direct serial connection, the wireless bridge communicates with a serial terminal or a computer that is running terminal emulation software—such as HyperTerminal, ProComm, or Telix. You can configure the bridge using a direct serial connection at any time, regardless of the current wireless bridge settings.

When using a Telnet connection, the unit communicates using TCP/IP with a computer running a Telnet client program. A Telnet connection can be used to configure wireless bridges outside of your local area network, when the configuration utility cannot be used, because the TCP/IP communication is routable.

Establishing a Direct Serial Connection

This method of configuring and managing a 3Com Wireless Building-to-Building Bridge uses a serial cable connected from the wireless bridge to a computer running terminal emulation software. HyperTerminal is one of the most widely used terminal emulation programs because it is standard software included with all recent Windows-based PCs. Use the following instructions to configure your wireless bridge using the HyperTerminal program.


- 1 Complete steps 1-10 of the hardware installation procedure in Chapter 2, “Installing the Hardware and Software.”
- 2 Connect a serial cable to your computer’s serial port. Make note of the PC’s COM port into which you plugged this cable. Plug the opposite end of the serial cable into the serial port on the wireless bridge.
- 3 On your desktop, click *Start*.
- 4 Click *Programs*.
- 5 Click *Accessories*.
- 6 Click *Hyperterminal*.
- 7 Double-click the file labeled *hypertrm.exe*.

The Connection Description screen appears. This screen allows you to enter a connection name (any alphanumeric combination) in the Name field. In addition, the Connection Description screen has an Icon field. Leave the highlighted icon at its default setting.

- 8 Click *OK* to proceed with Hyperterminal. Use the *Cancel* button to terminate Hyperterminal.

The Phone Number screen appears. The Country Code, Area Code, and Phone Number fields should be blank by default. Leave these fields at their default settings.

- 9 In the *Connect Using* field, select the COM port currently used by the RS-232 cable.

- 10 Click *OK*.
The COMx Settings screen appears.
 - 11 Select *9600* in the *Bits per second* field. Leave the default of *8* selected for the *Data Bits* field. Parity should be left at its default of *None*. The Stop bits setting should be left at its default of *1*.
 - 12 Select *None* for the flow control option.
 - 13 Click *OK* after all of the COM settings have been chosen.
The next screen will appear blank.
On some Windows platforms (such as Windows 98) you will have to save the settings, quit Hyperterminal, and then restart with the saved settings to allow them to take effect.
 - 14 To start the Configuration Utility, insert one end of an extended paper clip into the small hole labeled *Config*. (located next to the serial port on the wireless bridge) to press the configuration button.
The Terminal Configurator appears on the screen. You have successfully opened a direct serial connection to the Terminal Configurator.
If the wireless bridge is connected to power, but it does not respond within a few seconds after pressing the configuration button, disconnect power for a few seconds. Next, reconnect power and use the paper clip to press the configuration button again. If the terminal displays random characters, check the baud rate and bit settings in your terminal emulation software to ensure 9600 baud, 8 data bits, no parity, and 1 stop bit.
-  **NOTE:** If, after performing this step, the wireless bridge does not respond with the configuration mode Main Menu, verify that there is not a cable problem by pressing the Enter key on the PC and observing the Serial LED. Each time the key is pressed, the Serial LED should blink faintly and quickly. If the Serial LED does not blink, there may be a problem in the cable connection. If the Serial LED blinks when the Enter key is pressed and the unit does not respond, check to see if the serial configuration is set to 8 data bits, no parity, 1 stop bit.

Establishing a Telnet Connection

This method will open a Telnet connection to the Terminal Configurator on port 23, which is the default for most Telnet programs. However, this works only after the wireless bridge has been assigned a TCP/IP address. If you need to assign an IP address to the bridge, you will need to use either the Windows Bridge Manager or the Terminal Configurator using a direct serial connection.

- 1 Click *Start*.
- 2 Click *Run...*
- 3 Type:
telnet xxx.xxx.xxx.xxx

where xxx.xxx.xxx.xxx is the IP address of the unit you want to configure.

The Terminal Configurator appears on the screen. You have now successfully opened a Telnet connection to the Terminal Configurator.

Using the Terminal Configurator

Once you have established a connection to the Terminal Configurator, you will see the Main Menu. Use the arrow keys to move the highlighted bar between entries. If the arrow keys do not work, you can move the bar by holding down the Control key while pressing N (for *Next*) and P (for *Previous*) to move the bar. To select an entry, press Enter.

To modify the configuration, as described in the following sections, select *Edit configuration*. Another menu, listing available files to edit, will then appear. Selecting one of the available files will start an editor that you can use to modify the file. File selection and editor operation are described below.

After you have finished configuring the wireless bridge, select *Reset the Unit*, and then answer *Yes* to the confirmation. Selecting *Yes* will reset the device, allowing the new configuration to take effect, as well as place it into operating mode. The wireless bridge will then use your new configuration.

Main Menu Overview

The Main Menu provides the following options:

- **Resume operation**
Exits from terminal configuration mode. If you edited any configuration files, the changes will not take effect until you reset the bridge. Use the Reset the Building to Building Bridge option off the Main Menu to reset the bridge.
- **Edit configuration**
Displays a list of files to edit. Descriptions of the files and their contents are below.
- **View configuration for capture**
If you select this option, you will have an opportunity to enable capture mode in your terminal software. It will then display all configuration settings and give you the option to disable capture mode. You can use this option to keep a record of the settings made for a particular wireless bridge unit, or to generate a file if you need to contact 3Com Customer Support.
- **Reset configuration to default**
This option allows you to set all configuration files to their factory default settings.
- **View forwarding database**
Lists the MAC addresses of all network nodes detected, and the network interface on which they were last listed.
- **View roaming log**
Lists association and disassociation events for this wireless bridge.
- **View system error log**
Shows a list of status messages, if any have occurred. Use this option if the Status LED is lit to see what kind of message the wireless bridge is generating.
- **Clear system error log**
Removes all messages from the system event log described above.
- **View RSSI Information**
Displays received signal strength statistics.
- **Reset the unit**
Performs a hardware reset. Use this option after making configuration changes to allow the changes to take effect.

Edit Configuration Menu Overview

The Edit Configuration Menu contains three selections:

- **Return to Main Menu**
Goes back to the previous menu selections.
- **System**
Displays the editor screen with the configuration file for system options.
- **Bridged Ethernet (lan0)**
Displays the editor screen with the configuration file for the radio parameters and IP network settings.

Using The Editor

Selecting one of the configuration files above will bring that file into the editor. Once inside the editor, you may use arrow keys to move the cursor around. If the arrow keys do not work with your terminal emulator, press Ctrl+P for up [previous], Ctrl+N for down [next], Ctrl+B for left [back], and Ctrl+F for right [forward] for cursor motion.

For faster motion, press Ctrl+A to jump to the beginning of the line, and Ctrl+E to jump to the end. (Those familiar with the Emacs editor should feel comfortable with these keystrokes.)

To make changes in the editor, simply move the cursor to the point you want to change and start typing. You can delete text behind the cursor by moving the cursor to the position immediately following the character you want to remove, and then by pressing either the Backspace or Delete keys, or by typing Ctrl+H. To delete text in front of the cursor, press Ctrl+D. To delete text from the cursor to the end of the line, press Ctrl+K.

After editing is completed, save these changes by pressing Ctrl+W. After the changes are saved, the Edit Configuration menu will return to the screen. Although changes will be saved, they will not take effect until you power the wireless bridge off and back on. If you decide that you do not want to save the changes you have made, press Ctrl+X. The editor will ask you for confirmation, and then will return you to the Edit Configuration Menu.

Screen corruptions or confusions may occur due to many terminal emulation software packages not emulating VT100 correctly. If the screen display becomes corrupted or confused as you type, press Ctrl+L to force a screen to redraw the image.

Configuration File Format

Those familiar with the Windows WIN.INI file format will recognize the format of the configuration file. The file is divided into sections that define a particular grouping of options. Each section contains a section header at the top, shown as a string of text surrounded by square brackets: []. This string is the section title. After each section header, there is a list of entries containing equal signs. The text before the equal sign is a key and the text after the equal sign is the value. Changing the value of different keys is how configuration changes are performed.

Comments may be stored in the configuration file by inserting a pound sign (#) before the text to be added. This allows room for an explanation as to why certain settings have been made, who made the changes, etc. You may write anything in a comment, but the comment ends at the end of the line. You can create multi-line comments by inserting the # at the beginning of each line. For example:

```
# This is a comment.  
# This is line #2 of the comment.  
this = no comment  
# But this is one.
```

File Contents

System

[configure]

This section contains settings that pertain to the operation of the Configuration menus. Currently, there is only one: *password*.

- **password** This setting allows the creation of a password that will be asked for upon entry to the Configuration screen. Up to 15 alphanumeric characters will be accepted. Do NOT use any characters other than numbers and letters in this password. Although the password is not hidden from the screen while editing, it will be hidden when entering configuration.

[bridge]

This section contains variables that are not specific to the radio.

- **AP refresh period** This parameter has a default value of zero, which disables this function. Leave the AP refresh period at its default setting unless you are instructed to do otherwise by 3Com Technical Support.



NOTE: Activating the refresh period does not impair the performance of the wireless bridge.

- **encapsulation** This parameter has a default value of *on* allowing bridging to occur. Leave the encapsulation set to its default value unless you are instructed to do otherwise by 3Com Technical Support.

Bridged Ethernet (lan0)

[hardware]

This section contains settings for the actual wireless bridge radio hardware.

- **ESSID** This parameter specifies the wireless network with which the wireless bridge will be connecting. Alphanumeric values may be used in this field. All wireless bridges must have the same ESSID to form a connection.
- **station name** This parameter names an individual wireless bridge. The station name is used only for convenience of the network administrator and does not impact device operation. You may use any alphanumeric name.
- **mac address** This parameter specifies Media Access Control, which is a unique alphanumeric address that defines each node of the network. This address should always be set to the default value of *universal*.
- **operating mode** This parameter specifies the operating mode, which should always be set to the default value of *ibss*.
- **medium reservation** This parameter controls the 802.11 RTS/CTS threshold. The default value is *none*, which disables medium reservation. Specify a packet length, in bytes, to enable RTS/CTS medium reservation for packets larger than the indicated size.
- **channel** This parameter selects the channel setting for the radio. All wireless bridges in a single network should have the same channel setting.
- **mac timeout** This parameter controls the low-level MAC timeout. Do not change this parameter from its default value of 324 unless instructed to do so by 3Com technical support.

- **transmit rate** This parameter controls the data rate at which the radio transmits. Legal values are: 1, 2, 5, and 11.
- **antenna diversity** This parameter controls antenna diversity. The wireless bridge has only a single antenna, so this parameter should always be kept at its default value of *no*.
- **enable encryption** This parameter indicates whether WEP encryption by the radio is desired or not. Setting of the various encryption options is done in the [encryption] section.

[encryption]

This section contains the configuration parameters that are used when encryption is enabled. If encryption is not enabled, these parameters have no effect on the wireless bridge operation.

- **transmit key** This value sets which of the following keys are used to encrypt transmitted data. The default setting for this value is *1*.
- **encryption key 1-4** This value is one of the keys to use for encrypting and decrypting data on the radio. The key should be specified as either a 10-digit or a 26-digit hexadecimal number. Note that the number should always have a 0x before the hexadecimal digits. Use 10 digits for a 64-bit key, and 26 digits for a 128-bit key.

[rmp]

This section contains only a single low-level configuration parameter.

- **ethertype** This value should be changed only if requested by 3Com Technical Support.

[bootp]

This section contains parameters to configure and enable bootp for the wireless bridge. You can configure the wireless bridge to determine its IP information from a bootp server. When enabled, the wireless bridge attempts to get its IP Address, Netmask, and Gateway information from the bootp server.

- **enable bootp** This parameter should be set to *Yes* to enable bootp. Default value is *No*.
- **server ip address** This parameter should be set to force the wireless bridge to get bootp information from a specific server. Using the default value causes the wireless bridge to broadcast the requests to all available servers.
- **server name** This parameter has no impact on the operation of the wireless bridge bootp function, and is simply copied into the bootp messages. If your server requires a server name in bootp requests, then enter that name here.
- **server port** This parameter specifies the port on which the bootp server is listening. It is unlikely that you should ever have to change this setting.
- **host port** This parameter specifies the port from which the wireless bridge makes the bootp request. It is unlikely that you should ever have to change this setting.

[ip]

This section contains values for configuring the IP protocol. IP information is only necessary to “ping” the wireless bridge, or to “Telnet” to it. You are not required to set IP address information for normal operation of the wireless bridge, or to configure it using the Wireless Bridge Manager.

- **ip address** This value specifies the IP address that will be used by other computers to communicate with a particular wireless bridge.
- **netmask** When connected logically (AND) to the IP address, this value specifies the range of IP addresses within the local network.
- **broadcast** In the local network, this value is the IP address used to refer to all computers simultaneously. The default *automatic* will work for almost all configurations. There should be no need to change this value.
- **route** For the bridge, this value refer to section names that specify the routing options. The default of *automatic* will work for most configurations.
- **gateway** If present, this value specifies the IP address of your Internet router or firewall. By default, this value is set to *none*. Change this value to the IP address of your gateway if you intend to connect to the wireless bridge from a computer outside your subnet.

Error Codes

Error Code	Description
Xxxx: [yyyy]: section does not exist	Section named yyyy in configuration file named xxxx was missing. Save your current configuration (if applicable). Reset the wireless bridge configuration to factory defaults. Reset the wireless bridge. Restore configuration (if applicable).
Xxxx: [yyyy]: "zzzz": entry refers to non-existent section	Entry zzzz refers to a section that is not located in file xxxx. Save your current configuration (if applicable). Reset the wireless bridge configuration to factory defaults. Restore configuration (if applicable).
Xxxx: [yyyy]: "zzzz": entry does not exist	Entry zzzz in section yyyy of file xxxx was missing. Save your current configuration (if applicable). Reset the wireless bridge configuration to factory defaults. Reset the wireless bridge. Restore configuration (if applicable).
Xxxx: [yyyy]: "zzzz": entry is invalid	Entry zzzz in section yyyy of file xxxx contains an invalid value. Check the entry in the configuration for zzzz. If you cannot find zzzz in the wireless bridge Bridge Manager program, you may have to use the serial port or Telnet configuration menus.
Xxxx: <[yyyy]zzzz>: Unable to add route.	Route values are out of range compared to the interface values. Set the route value to <i>automatic</i> . If <i>automatic</i> does not work for your wireless bridge, check the values you set for the route to make sure they correspond to your other IP parameters.
Xxxx: file does not exist.	Configuration file could not be found. Reset the configuration to factory defaults, and reset the wireless. If the problem persists, contact 3Com Customer Support.

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Limited Warranty and Regulatory Compliance Information

3Com Corporation Limited Warranty

This warranty applies to customers located in the United States, Australia, Canada (except Quebec), Ireland, New Zealand, U.K., and other English language countries, and countries for which a translation into the local language is not provided

3Com Wireless Building-to-Building Bridge

HARDWARE

3Com warrants to the end user ("Customer") that this hardware product will be substantially free from material defects in workmanship and materials, under normal use and service, for the following length of time from the date of purchase from 3Com or its authorized reseller:

Warranty duration.

One (1) year.

3Com's sole obligation under this express warranty shall be, at 3Com's option and expense, to repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or if neither of the two foregoing options is reasonably available, refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products or parts may be new or reconditioned. 3Com warrants any replaced or repaired product or part for ninety (90) days from shipment, or the remainder of the initial warranty period, whichever is longer.

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TO THE FULL EXTENT ALLOWED BY LAW, 3COM ALSO EXCLUDES FOR ITSELF AND ITS LICENSORS AND SUPPLIERS ANY LIABILITY, WHETHER BASED IN CONTRACT OR TORT (INCLUDING NEGLIGENCE), FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE, OR INTERRUPTION OF ITS PRODUCTS, EVEN IF 3COM OR ITS AUTHORIZED RESELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND LIMITS ITS LIABILITY TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. THIS DISCLAIMER OF LIABILITY FOR DAMAGES WILL NOT BE AFFECTED IF ANY REMEDY PROVIDED HEREIN SHALL FAIL OF ITS ESSENTIAL PURPOSE.

Some countries, states, or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for death or personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights which may vary depending on local law.

GOVERNING LAW

This Limited Warranty shall be governed by the laws of the State of California, U.S.A., and by the laws of the United States, excluding their conflicts of laws principles. The United Nations Convention on Contracts for the International Sale of Goods is hereby excluded in its entirety from application to this Limited Warranty.

3Com Corporation
5400 Bayfront Plaza
P.O. Box 58145
Santa Clara, CA 95052-8145 USA
(408) 326-5000

4/12/01
v8.2

Regulatory Compliance Information

FCC RADIO-FREQUENCY EXPOSURE NOTICE

This device generates and radiates radio-frequency energy. In order to comply with FCC radio-frequency radiation exposure guidelines for an uncontrolled environment, this equipment has to be installed and operated while maintaining a minimum body to antenna distance of at least 2 meters.

This product does not contain any user serviceable components. Any unauthorized product changes or modifications will invalidate 3Com's warranty and regulatory approvals. This product must be installed by a professional technician/installer.

FCC PART 15 NOTICE (APPLICABLE TO USE WITHIN THE USA)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to use a professional technician to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receiver is connected to.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

The Interference Handbook

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402.
Stock No. 004-000-00345-4.

MANUFACTURER'S DECLARATION OF CONFORMITY

3Com Corporation

5400 Bayfront Plaza
P.O. Box 58145
Santa Clara, CA 95054-8145
(408) 326-5000

Declares that the product:

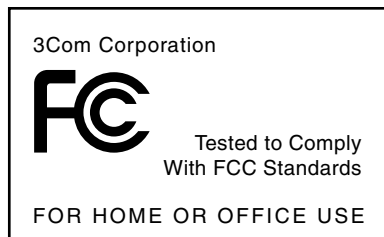
Date: 31 May 2001

Brand Name: 3Com Corporation

Model Number: WL-311

Equipment Type: Wireless LAN

Complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



INDUSTRY CANADA NOTICE (APPLICABLE TO USE WITHIN CANADA)

This Class B digital apparatus complies with Canadian ICES-003.


To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

AVIS DE CONFORMITÉ À LA RÉGLEMENTATION D'INDUSTRIE CANADA

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Pour empêcher que cet appareil cause du brouillage au service faisant l'objet d'une licence, cet appareil doit être utilisé à l'intérieur seulement et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal.

EUROPEAN COMMUNITY - CE NOTICE

Marking by the symbol:  indicates compliance of this equipment to the R&TTE Directive 1999/5/EC. Such marking is indicative that this equipment meets or exceeds the following technical standards:

- ETS 300 328 - Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques
- ETS 300 826 - Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for 2,4 GHz wideband transmission systems and High PERformance Radio Local Area Network (HIPERLAN) equipment
- ES 59005 - Considerations for the evaluation of human exposure to electromagnetic fields (EMF's) from mobile telecommunication equipment (MTE) in the frequency range 30 MHz - 6 GHz
- EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment. (CISPR 22 Class B).
- EN 60950 - Safety of information technology equipment, including electrical business equipment.

SAFETY COMPLIANCE NOTICE

This device has been tested and certified according to the following safety standards and is intended for use only in Information Technology Equipment which has been tested and certified to these or other equivalent standards:

- UL Standard 1950 / CSA C22.2 No. 950
- IEC 60950
- EN 60950

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